

ABSTRACT

Bushings (26, 52, 66, 86) are provided that have a tubular portion that fits within an opening (38) in a work member (40) and a radial flange at each end of the tubular portion. In a first embodiment, a first bushing part includes a tubular section (30) and a radial flange section (32) at one of its ends. When the tubular section (30) is within the opening (38), and the radial flange section (32) is against a first wall (46) of the work member (40), an end portion (42) of the tubular section (30) projects outwardly of the opening (38) beyond the second sidewall (44). A second bushing part (28) has an annular flange portion (34) with a center opening (36) in which the projecting end portion (42) of the tubular section (30) fits. The second bushing (52) has two bushing parts (52, 58), each of which includes a tubular section (54, 60) and a radial flange section (56, 62). Tubular section (54) is inserted into the opening (38), from one side of the work member (40) tubular section (60) is inserted into tubular section (54) from the opposite side (44) of the work member (40). The third bushing (66) has three parts. A first tubular part (68) fits into the opening (38). A tubular section (62) of a second bushing part (70) is inserted into the bushing part (68) from one side of the work member (40). A tubular section (78) of a third bushing part (76) is inserted into the bushing part (68) from the second side of the work member (40). Tubular sections (72, 78) have radial flanges (74, 80) at their outer ends. The fourth bushing (86) has two bushing parts (88, 90) which may be identical in construction. Each has a tubular section (92, 96) and a radial flange section (94, 98) at one end of its tubular section (92, 96). The tubular sections (92, 96) are inserted into the opening (38) from opposite sides of the work member (40). All bushings (25, 50, 66, 86) are installed in substantially the same way. A mandrel (M) is moved through the interior of the tubular portion of the bushing to radially and circumferentially expand the tubular portion of the bushing and move the flange sections against the opposite sidewalls of the work member (40). The tubular

portion of the bushing is radially and circumferentially
expanded an amount sufficient to introduce fatigue life
40 enhancing compressive residual stresses in the work member
(40) immediately around the opening (38) in the work member
(40).